

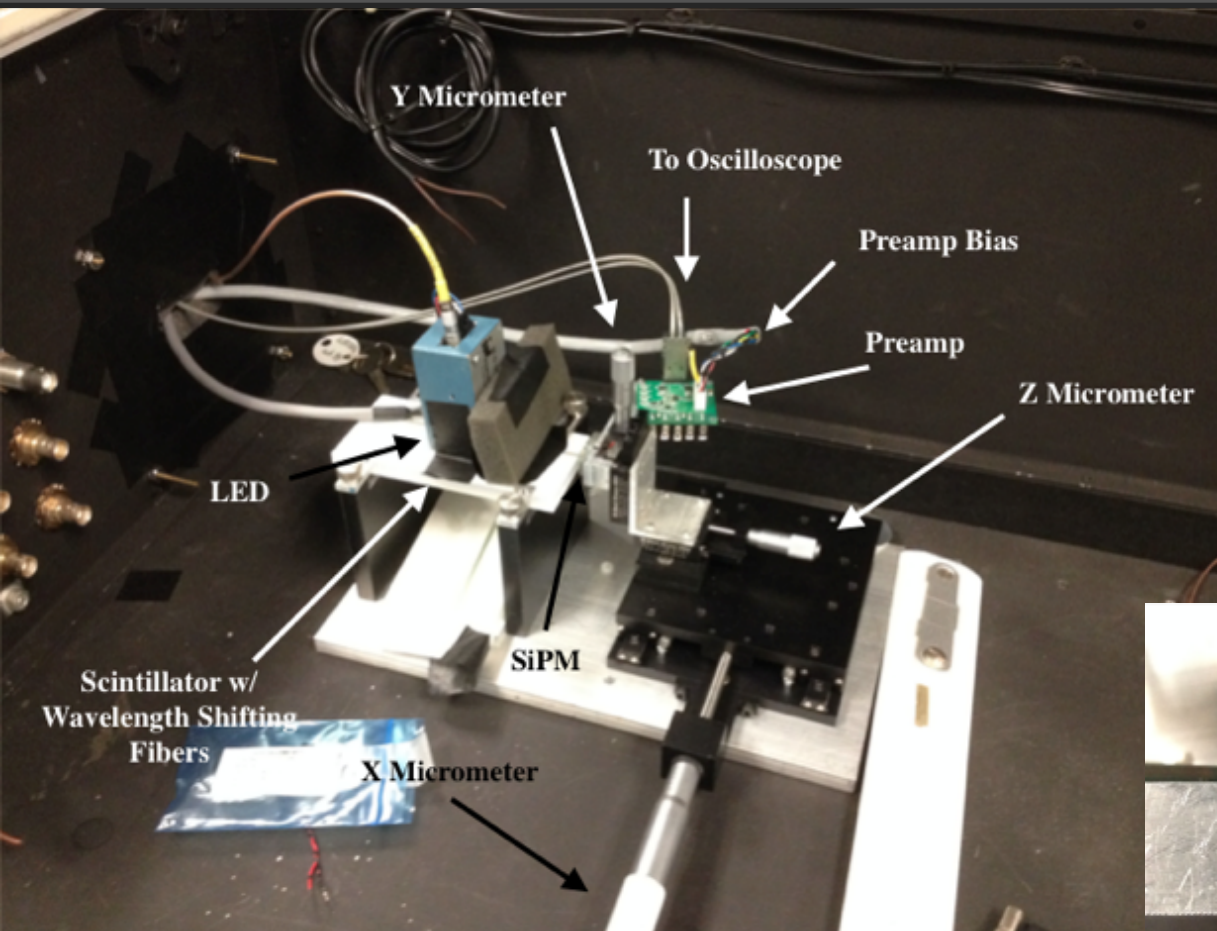
SiPM Measurements: Position and Gain

Hannah Hamilton

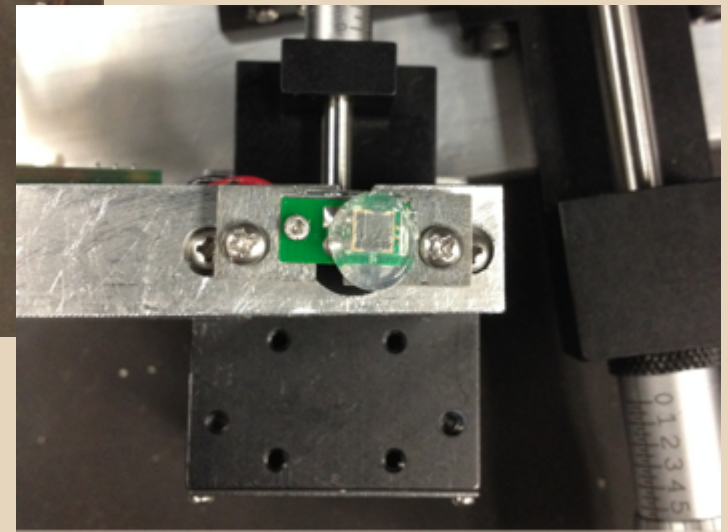


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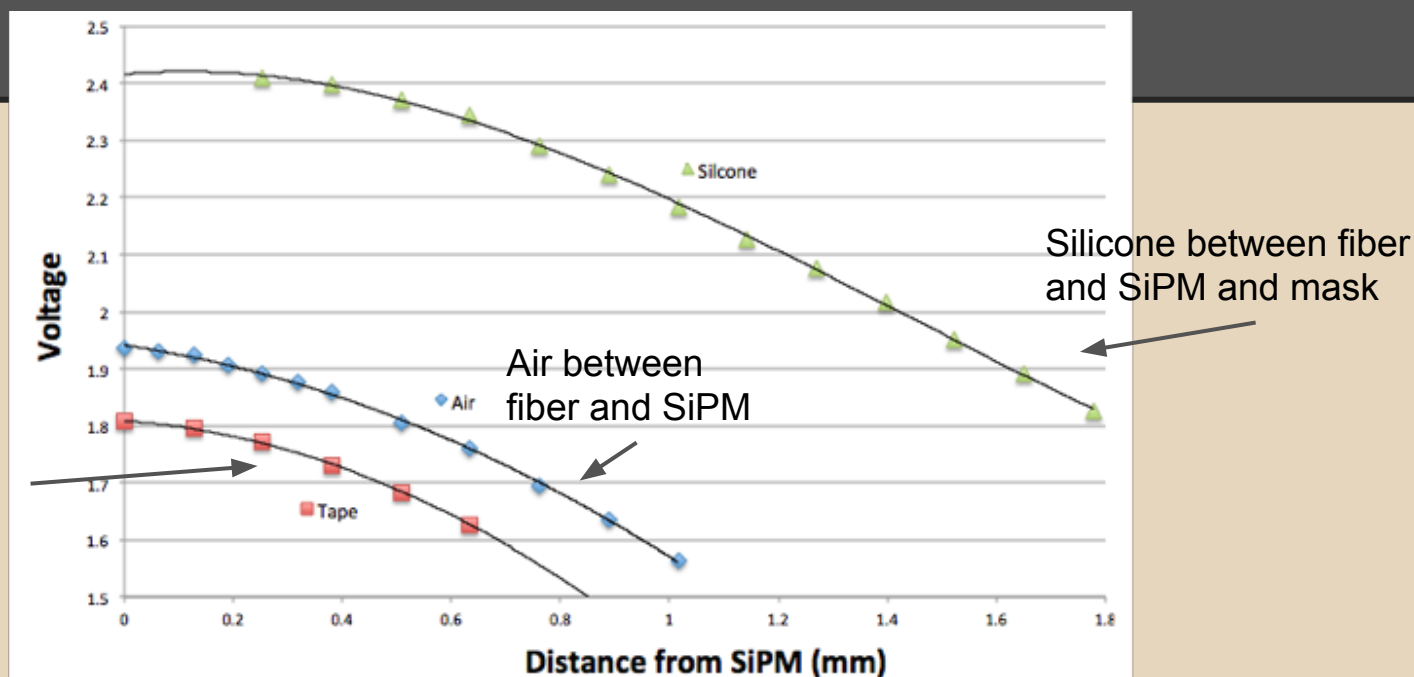
Setup



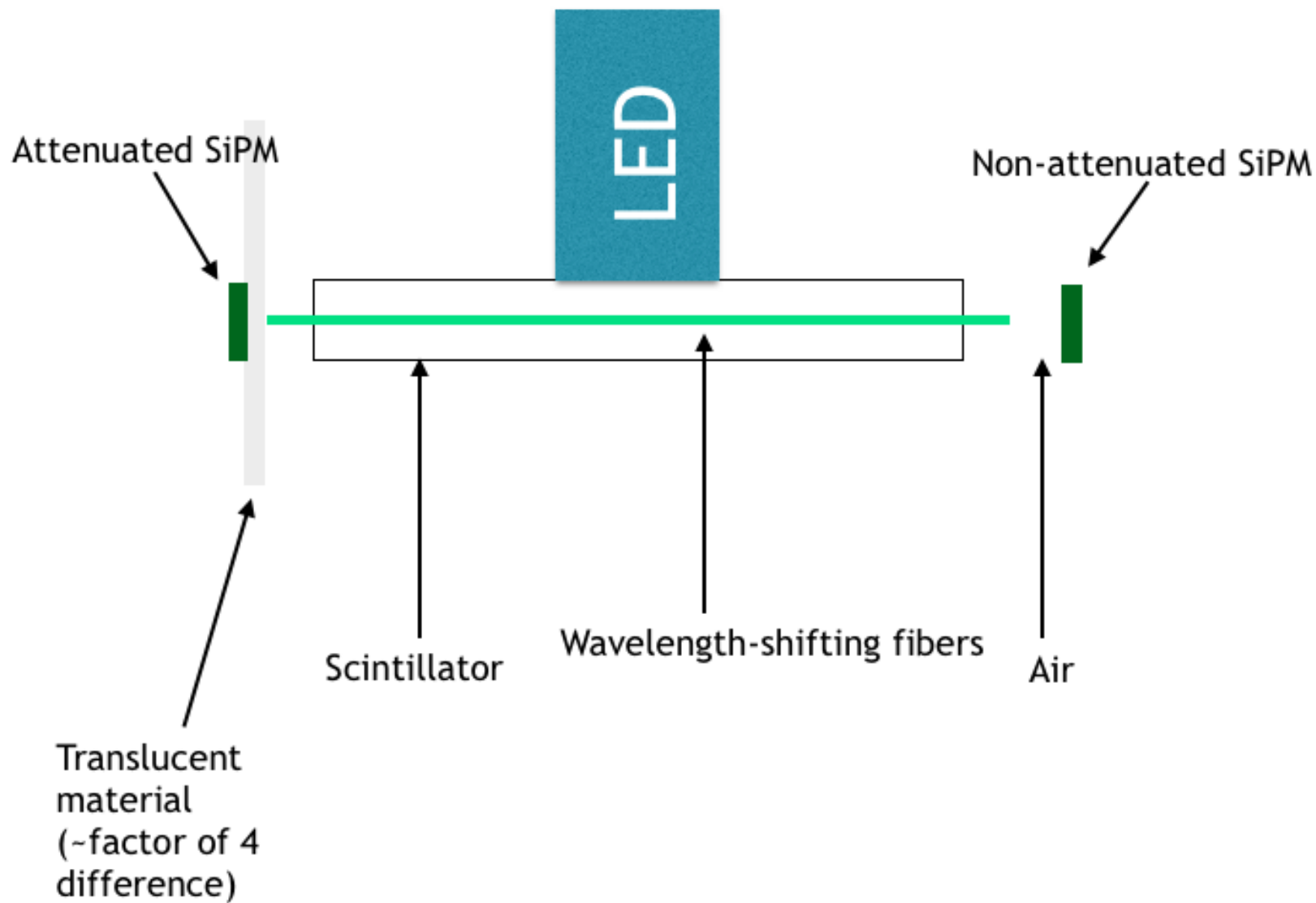
- This setup was contained in a light-tight box.
- The silicone gel used was Dow Corning 3145 RTV (shown below)
- SiPM on other end added later



Position Results

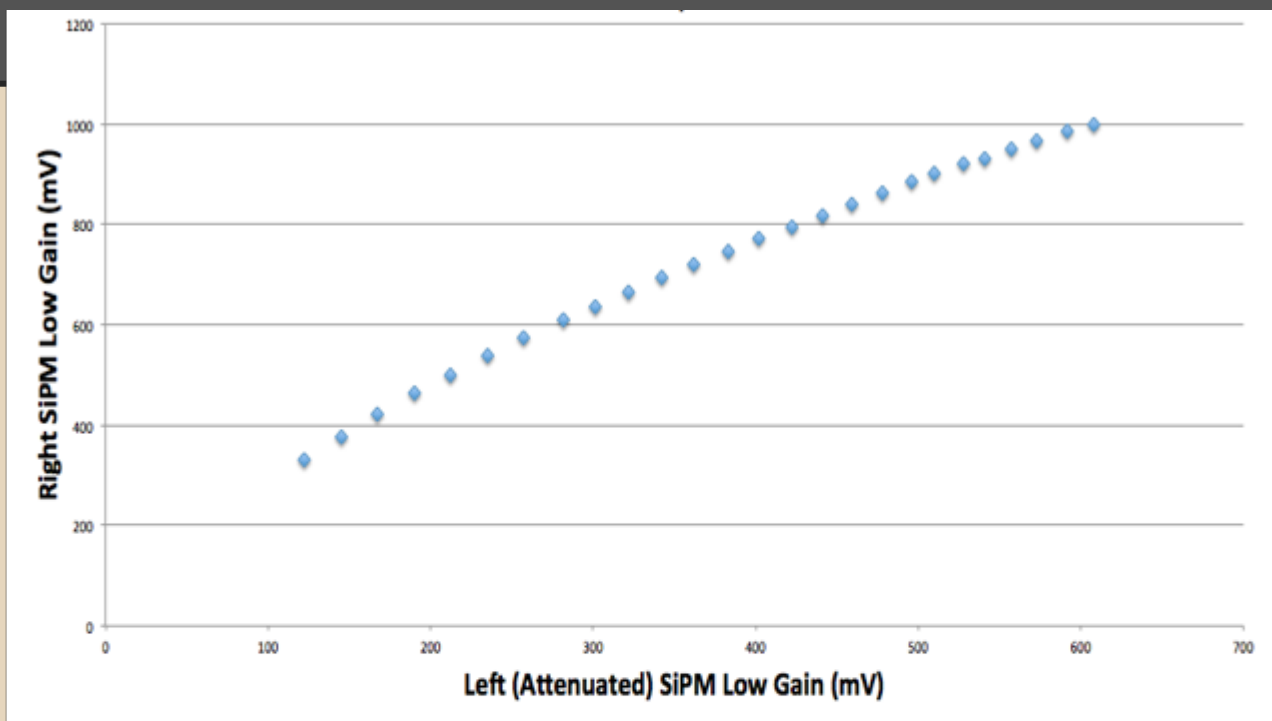


What we measured	Why we measured it	Expected results	Observed Results	Analysis
x, y, and z positions vs. signal voltages	To find the position that provides both appropriate saturation levels, as well as higher signal voltages.	<ul style="list-style-type: none"> Region where dV/dz was near 0. Expected to fall around the width of the SiPM. 	<ul style="list-style-type: none"> Expected behavior seen 	<ul style="list-style-type: none"> Silicone prevented some light from escaping Saw regions of pixels saturate before entire SiPM



Plot output at different LED intensities (shown on next slide).

Gain Results



What we measured	Why we measured it	Expected results	Observed Results	Analysis
The gain ratio between an attenuated SiPM and non-attenuated SiPM	To determine the saturation behavior of SiPMs with various levels of attenuation.	<ul style="list-style-type: none"> Linear region with factor of 4 difference. 	<ul style="list-style-type: none"> Saw factor of 2 difference Fairly linear 	<ul style="list-style-type: none"> Possible inadequate attenuation Possible incorrect single pixel calibration

HCal Lab: Trigger and Asymmetry Studies

Reuben Byrd and Cecily Towell

Trigger Study: 3 Thresholds

- Goal: minimize noise/keep cosmic muons
- Expected rate: ~10hz
- HBD FEM trigger has 3 parameters
- Each of the 3 different parameters were varied to determine the optimal trigger for SiPM:
 1. Total number of pixels above threshold (10-80)
 2. Total number of the 8 SiPMs above threshold (2-4)
 3. Threshold settings (1-6)

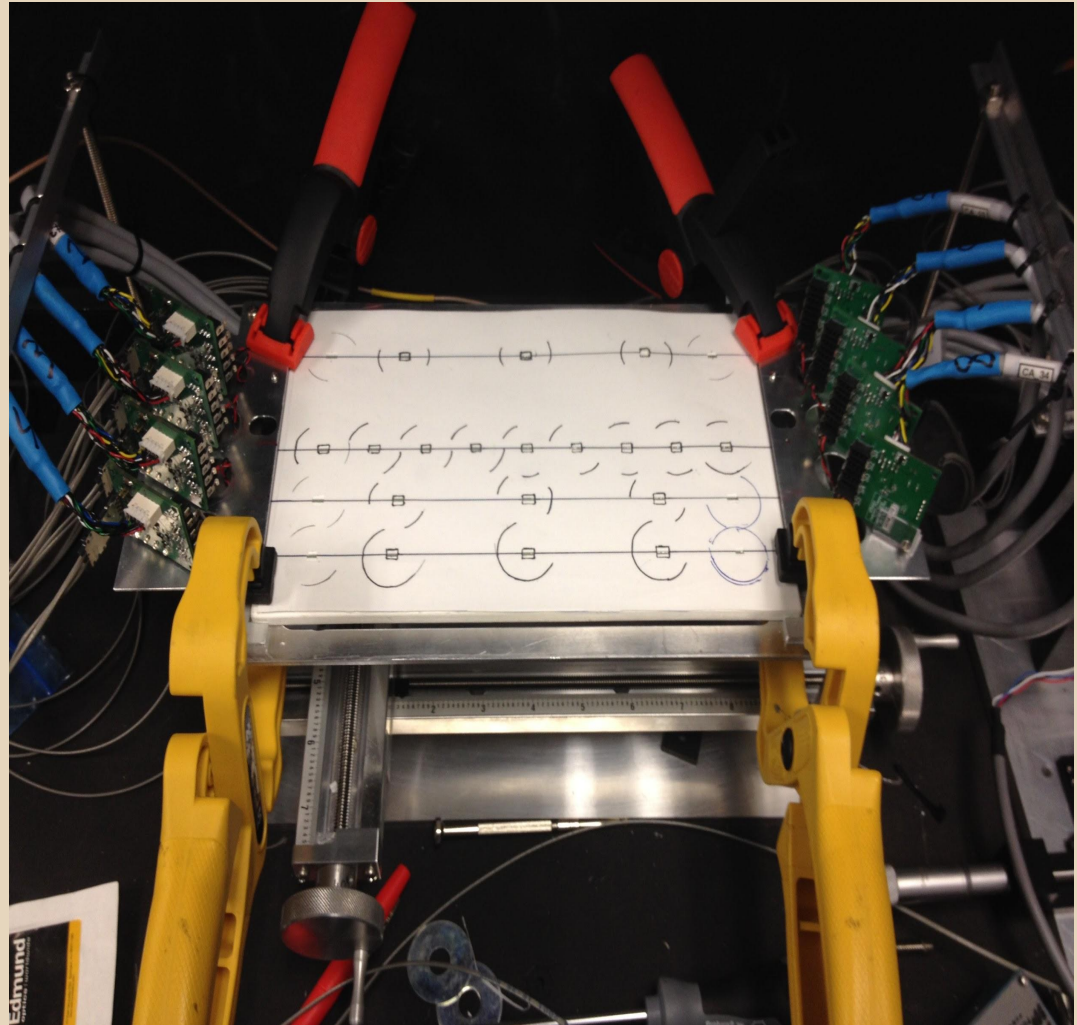
Results

- Many short runs taken with different parameter settings
- Two 8 hour runs with:
 - 40 : 3 : 3
 - 30 : 4 : 2
- Edouard used this study to help select the current trigger settings

Parameters:	1	2	3	Rate (Hz)	Time (seconds)	1: Total number of Hits (10-80)
	15	4	2	22.7	10	2: Number of SIPM > threshold (2-4)
	15	3	2	104.5	10	3: MIP threshold (1-6)
	15	2	2	1071.7	10	
	10	4	2	35	10	
	20	4	2	21.3	10	Wanting ~10hz trigger
	25	4	2	17.1	10	
	30	4	2	14.3	10	
	35	4	2	13.6	10	
	40	4	2	19.8/24/21.6	10	
	45	4	2	13.5	10	
	50	4	2	13.5	10	
	55	4	2	11	10	
	60	4	2	11.3	10	
	65	4	2	8.6	10	
	70	4	2	8.4	10	
	75	4	2	10.1	10	
	80	4	2	9.6	10	
	15	4	1	46.5	10	
	15	4	3	17.7	10	
	15	4	4	15.3	10	
	15	4	5	15.4	10	
	15	4	6	11.6	10	
	80	4	6	12.3	10	
	30	3	3	17.8	10	
	35	3	3	16.6	10	
	40	3	3	14.1	10	
	45	3	3	11.9	10	
					# of hits	
LONG RUNS	30	4	2	17.2	26995	463202
	40	3	3	14.9	29015	431811

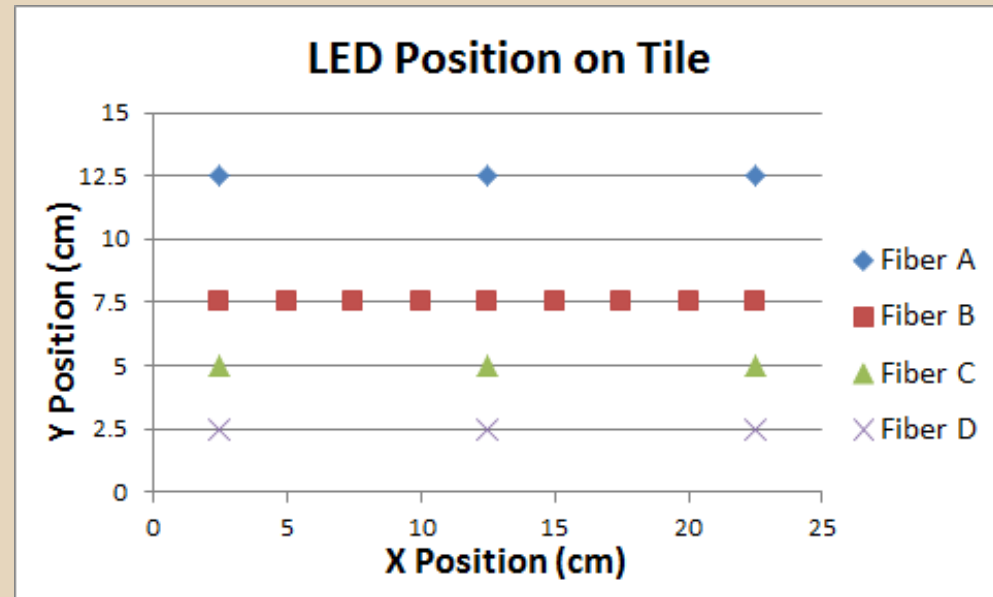
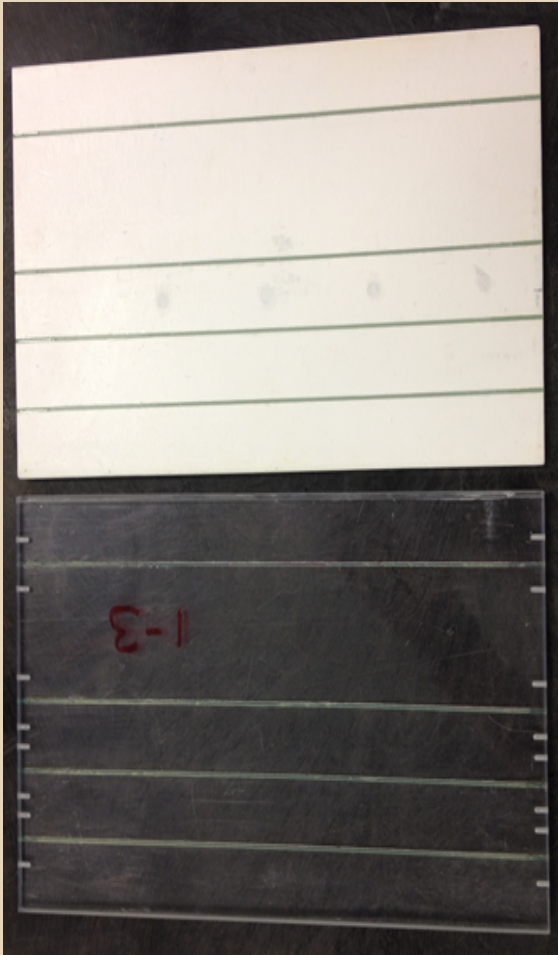
Asymmetry Study

- Purpose: position resolution study.
- Asymmetry: ratio of the difference of the signal from the two ends of a fiber.
- LED used to provide signal



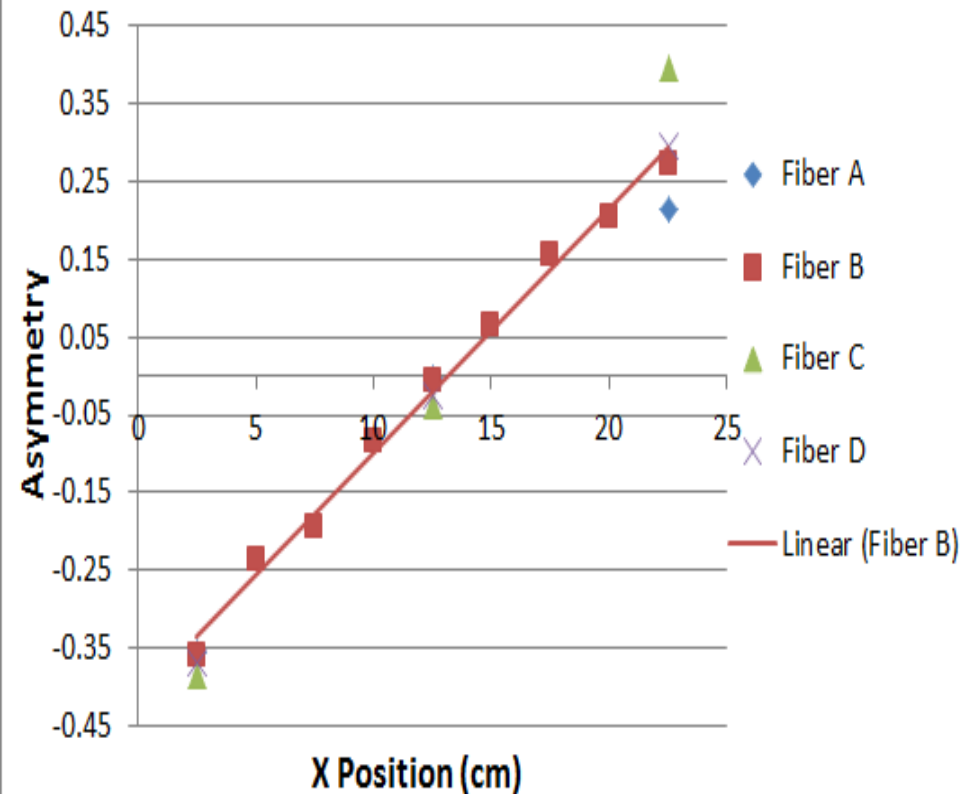
Tiles and Template

- Asymmetry measurements on 4 tiles
- We made a template for the LED position on the tiles so that our studies were uniform.

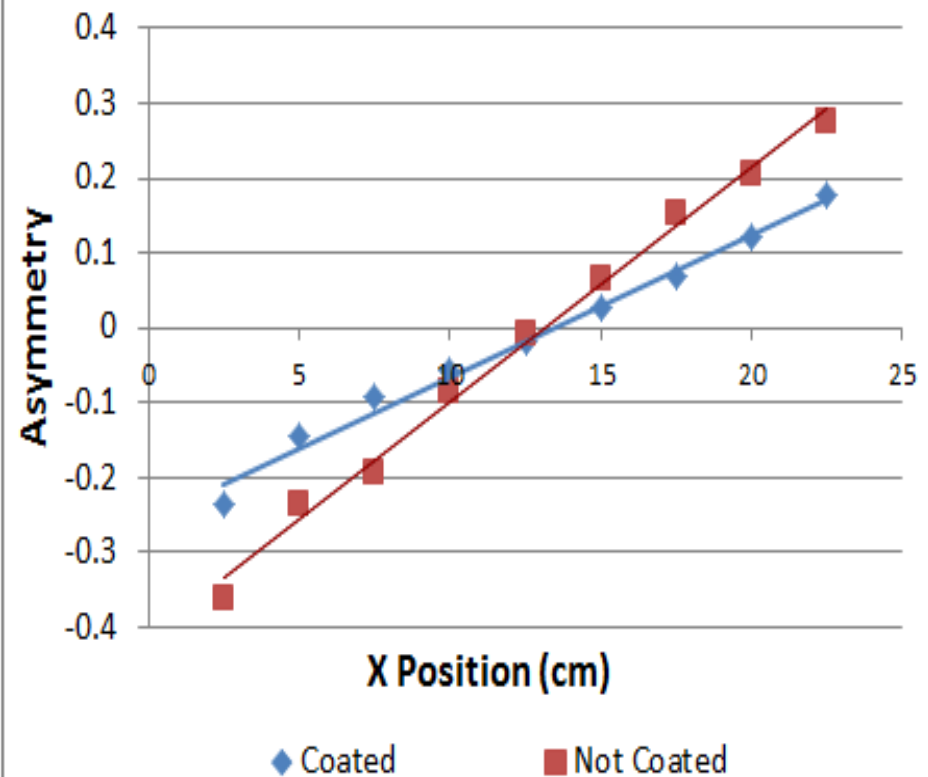


Asymmetry Plots

Not Coated Tile

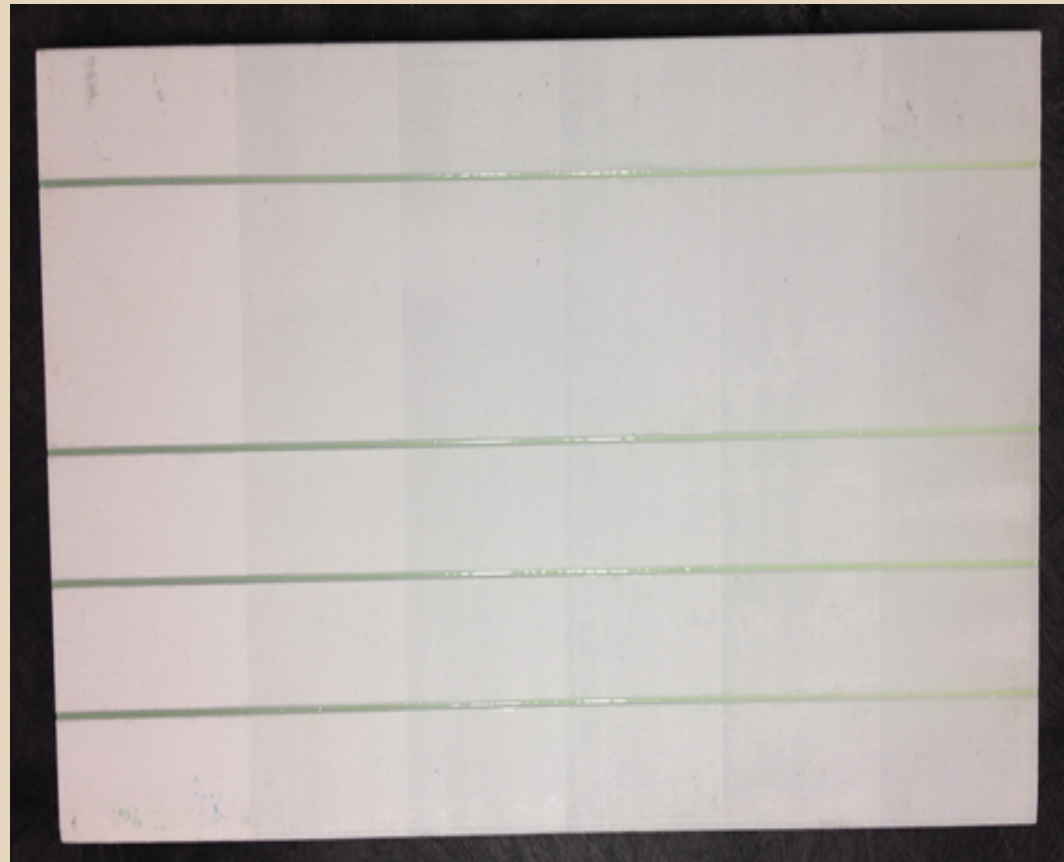


Coated and Not Coated Tile

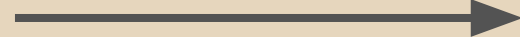


Next Steps

- Starting asymmetry measurements on gradient tiles



Completely
Coated



Less
Coating